young squash vine or large hollyhock; and flowers more than an inch long and in shape and structure resembling those of a *Gerardia*. They did not resemble *Gerardia*, however, in their color, which was a pale lilac, with a few darker spots on the spreading corolla-lobes near the throat and three lines of bright orange running back from the lower lobe into the throat.

Mr. Collins sent fresh material to the Gray Herbarium, where it was determined as a devil's-claw, *Martynia*, or *Proboscidea*, as the particular group to which this plant belongs is now often called. It is not, however, the species, *P. louisianica*[1] (Mill.) Thell. which is reported in manuals as an occasional waif in the northeastern United States. Except for its paler color (and that is a kind of variation to be expected), the flower agrees excellently with the description and illustration of *P. fragrans* Decsne. in Van Eseltine's "Preliminary Study of the Unicorn Plants (Martyniaceae)," N. Y. State Agr. Exp. Sta. Techn. Bull. 149 (1929). Mr. Collins's plant is not, as to foliage, the typical form of that species, which has lobed leaves, but the entire-leaved form (according to Van Eseltine) described as *P. violacea* Decsne.

P. fragrans is a native of Mexico. I find no record of it from the northeastern United States. At Lawrence, it grew beside one of the mill buildings where wool is scoured and where, therefore, seeds which have come with the wool are particularly likely to be thrown out with the waste.—C. A. WEATHERBY, Gray Herbarium.

MONOGRAPHIC STUDIES IN THE GENUS ELEOCHARIS—II

H. K. SVENSON

(*Concluded from page 203*)

60. E. COMPRESSA Sull. (FIG. 62, 63 and PL. 220, FIGS. 5, 18). Culms strongly flattened, often 1.5 mm. in width, striate, erect from thickened creeping rootstocks: upper sheaths 2–9 cm. high, reddish-brown to stramineous, truncate, faintly to prominently toothed: spikelets 5–12 mm. long, oblong-ovate to ovate, acute or obtuse: scales ovate-lanceolate, chestnut brown, the whitened tips attenuate and commonly bifid: style 3-fid: achene 1–1.5 mm. long, obovate-pyriform, golden-

[1] Dr. S. F. Blake has kindly called my attention to the fact that the spelling of the specific name "*louisiana*," used in Gray's Manual and other recent works, though actually appearing in the text of the eighth edition of Miller's Gardening Dictionary, was corrected to "*louisianica*" in a list of errata at the end of the volume.

yellow to brown, bluntly trigonous to nearly terete, granular-roughened or reticulate under magnification, the raised margins of the cells often forming undulating lines: the style-base depressed-conic to globose-conic, usually acute: bristles 1–5, fugacious, usually shorter than the achene.—Am. Journ. Sci. xlii. 50 (1842); A. Gray, Man. ed. 2. 497 (1856). (?) *Scirpus acuminatus* Muhl. Desc. Gram. 27 (1817); *E. acuminata* Nees, Linnaea ix. 294 (1835); Kunth, Enum. ii. 156 (1837); Boeckl. Linnaea xxxvi. 448 (1869–1870); Britton & Brown, Ill. Fl. i. 255, fig. 596 (1896); Robinson & Fernald in Gray, Man. ed. 7. 184, fig. 259 (1908); Britton in Abrams, Ill. Fl. Pacific States i. 266, fig. 637 (1923).—Wet places, usually in calcareous soil; western Quebec to Saskatchewan, southward to Georgia and Oklahoma; also "Washington (?) and British Columbia" (Britton, l. c.). The following specimens have been examined. QUEBEC: Queen's Park, Aylmer, *Malte* 1198[a]. NEW YORK: Rome, *Vasey;* Dexter, *Vasey*. PENNSYLVANIA: Bair's Island, Lancaster County, *MacElwee* (Ph.) MARYLAND: rocky island in the Potomac, Montgomery County, *J. D. Smith* in 1881. DISTRICT OF COLUMBIA: Washington, *L. F. Ward* in 1879; wet grounds, *Morris* 2963 (B). GEORGIA: Chicamauga Park, *Canby, Sargent & Bush* 128. ONTARIO: Belleville, *Macoun* 295; near Sarnia, *C. K. Dodge* 7170 and in 1895 (G, B); Temagami Forest Reserve, *C. K. Dodge* 407 (C); Thunder Bay, Ontario, *Macoun* 32178 (C); east coast of Lake Nipegon, *Macoun* 32177 (C); Oliphant, *A. B. Klugh* in 1905 (B). MICHIGAN: Port Huron, *C. K. Dodge* in 1898; Thunder Bay Island near Alpena, *C. F. Wheeler* in 1895; between Eagle Rock and E. Narba (?), Lake Superior, *Robbins* 111. OHIO: wet places in the Darby Plains, 15 miles west of Columbus, *Sullivant* (TYPE coll.) (G). INDIANA: slope of the Ohio River, North, *Deam* 48551 (D); low border of lake northwest of Laketon, *Deam* 31950 (D). WISCONSIN: Avoca, *J. J. Davis* in 1923 (W) and 1931 (W); arena, *J. J. Davis* in 1922 (W); Durand, *J. J. Davis* in 1920 (W). ILLINOIS: Wady Petra, *V. H. Chase* 635 (G, I), 613 (G, I, D); wet prairie, Mira, *H. A. Gleason* 1557; *E. Hall* in 1870 (locality not given); wet prairies, Englewood, *E. J. Hill* 60 in 1875 (I); Kankakee, *E. J. Hill* in 1870 (I), 39 and 45[a] in 1874 (I), 150 in 1878 (I); Mississippi river bottoms, Oquawka, *Patterson* (I); clay roadside, Gardner's Park, Chicago, *A. Chase* 1025 (I); Peoria, *Brendel* (I); swamp near Mt. Carmel, Wabash County, *J. Schneck* in 1897 (I); wet prairies, Wheaton, *J. Schneck* 25 in 1894 (I); Ringwood, *Vasey* (I, B); Forest Glen, *W. S. Moffatt* 102 (W). IOWA: Clinton, *Vasey;* Grinnell, *M. E. Jones* in 1877 (P); Wright County, *Shimek* in 1882 (W); Vinton, *J. J. Davis* (without date) (W). MISSOURI: wet places in hills, St. Louis, *Eggert* in 1887; open dry slopes, Cedar Gap, alt. 1675 ft., *O. E. Lansing* 3000; prairie swales, Greenwood, *B. F. Bush* 6696; St. Louis, *J. A. Drushel* 4275 (N, B). SASKATCHEWAN: damp prairie, Bredenbury, *Macoun & Herriot* 73041 (G, C); Souris Plain, *Macoun* 6; Moose Jaw Creek, *Macoun* 32174 (C); Moose Mts. Creek, *Macoun* 301. MANITOBA:

Forest, *Macoun* 16378 (C); Porcupine Mts., *Macoun* 32179 (C). North Dakota: in wet soil, Butte, *Lunell* in 1906; Leeds, *Lunell* 8; White Rock, *Powell* in 1903. South Dakota: Brookings, Williams (P). Nebraska: Minden, *Hapeman* in 1897 (D, W); Kennedy, *Bates* in 1893 (B); Arabia, *Bates* in 1891 (B); Long Pine, *Bates* in 1898 (B). Kansas: Topeka *B. B. Smyth* in 1891 (I). Oklahoma: low places near Marietta, *G. W. Stevens* 87. Britton & Brown (l. c.) also include Louisiana in its range.

E. acuminata (Muhl.) Nees is based on Muhlenberg's brief description "Culmo nudo compresso pedali. Spica una terminali ovata acuminata. Cal. squama fusca acuminata." There has been no definite typification of the species which is supposedly in the Muhlenberg herbarium in Philadelphia. Torrey (1836) could find no specimens to correspond with the description, nor have I, in a recent examination of the Muhlenberg collection, been able definitely to trace any plant as *S. acuminatus*. Some of the Muhlenberg herbarium has been converted into book-form in which the specimens lie loose among the pages. Under the heading "Scirpus Mon. 26b" appears a single culm of *E. tuberculosa* in mature fruit with the label "26 c," four or five culms of *E. rostellata* and an equal amount of unlabeled *E. Smallii* which has acuminate spikelets and scales, and which is in the flowering stage. These specimens of *E. Smallii*, though conforming fairly well with Muhlenberg's incomplete description of *Scirpus acuminatus*, can not under such circumstances be considered as the type of *S. acuminatus*, and it has been a relief to fall back on Sullivant's thorough description of *E. compressa*, which is substantiated by excellent herbarium material. Farwell has recently[1] considered *Eleocharis glaucescens* (Willd.) Schultes to be a synonym of *E. acuminata*, but there seems to be little basis for this disposition of *E. glaucescens*.[2] A photograph in the Gray Herbarium of the Willdenow plant shows that *E. glaucescens* is a member of the *Palustris* group.

The specific delineation and geographical distribution of *E. compressa* are still unsettled and can only be accurately determined by extensive field work in the central states. The chief means of differentiation employed in this treatment are the wide flattened culms and the acuminate, often bifid scales. These characters are most marked in material from the prairie states; especially at the borders of the range occasional specimens are found with narrower culms and with scales which are not so markedly acuminate. Such forms are

[1] Rhodora xxxii. 30 (1930).
[2] See the paper by M. L. Fernald, Rhodora xxxii. 31 (1930).

with the greatest difficulty separated from *E. capitata* to the eastward and from *E. acutisquamata* to the southwest. This is especially true of some of Deam's plants from marl bogs in Indiana. In typical *E. compressa* the achene has a tendency to be more rounded than in *E. capitata*, with less prominent surface-markings and the style-base usually in the form of a low cone. In all the specimens examined the fibrovascular system is practically continuous, whereas in *E. capitata* the four to eight fibrovascular bundles are separate.

Distinct, in most cases, from typical *E. compressa* is a plant of the Great Lakes region to Anticosti, characterized by large spikelets and conspicuously blackened scales which are usually short-acuminate:

Var. **atrata**, n. var. (TAB. 220, FIG. 6), squamis atratis; spicis frequenter majoribus, in specimine typico ad 1.2 cm. longis.—ANTICOSTI:[1] Riv. McKane, *Marie-Victorin & Rolland-Germain* 27515. NEW YORK: wet limestone rocks, Buffalo, *Clinton* in 1864 (G). PENNSYLVANIA: damp dunes, Presque Isle, *Pease* 12991, (TYPE in Gray Herb.). ONTARIO: Port Colborne, *Macoun* 34568 (G, C); Pt. Edward, *Macoun* 34569 (G, C); river shore, Galt, *Herriot* 16 (G). MICHIGAN: dune sand, Saugatuck, *Wheeler* in 1904 (G); Muskegon, *Wheeler* in 1900 (G); Clifton, *Farwell* 548 (G); Douglas Lake, Cheboygan County, *Swallen* in 1924 (G); Sailor's Encampment, *E. T. & S. A. Harper* in 1897 (W, B); sandy shore of Little Traverse Bay, *Ehlers* 2536 (W). INDIANA: moist sand, Indiana Harbor, *Bebb* 2048 (W); swales, Clarke, *Umbach* 3558 (W); swales, Gary, *Umbach* 3691 (W). WISCONSIN: Washington Island, Door County, *A. M. Fuller* 1420 (D).

E. erythropoda Steud. Syn. Cyp. 76 (1855) described with culms "compressiusculo" "Ohio Am. Sept." "*Scirpus tenuis*, Herb. Un. it. Frankii 1837" is probably *E. compressa*.

61. E. ACUTISQUAMATA Buckl. (Fig. 60, 61 and PL. 220, FIG. 7). Culms 3–4 dm. high, rigid, slender, (about 0.5 mm. in diameter), angled, striate and sulcate, from lignified thickened rootstocks: sheaths gray to purplish, the apical tooth not conspicuous: spikelets oblong-ovate, acute, 0.7–1 cm. long, 15–20 flowered: scales reddish-brown, ovate-lanceolate, with inconspicuous whitened acute to acuminate tip: achene 1–1.5 mm. long (including the style-base), golden-yellow to brownish, obovate-pyriform, almost terete, with a very blunt outer angle, and a granular-roughened obscurely reticulated surface: style-base brown, short-conic: bristles none.—Proc. Acad. Sci. Philadelphia 1862. 10 (1863).—Texas and Oklahoma. TEXAS: San Saba County, *Buckley* (TYPE in herb. Philadelphia Acad.); Edwards Plateau, 14 mi. west of Austin, *Tharp* 995 (Ph); marshy sand, Austin, *Tharp* 1009 (Ph); near Austin, *Buckley*, very young (Ph). OKLAHOMA: Limestone Gap, *G. D. Butler* 261 (G).

[1] The separation of *S. compressa* from *S. capitata* in Anticosti is especially difficult.

E. acutisquamata is related to *E. compressa*, but differs in having narrow culms, less prominent scale-tips, and apparently a more ligneous base. The achenes, as in typical *E. compressa*, are nearly terete, with granular-reticulate surface. Within *E. acutisquamata* should perhaps be included a *Drummond* plant from New Orleans, represented in the Gray Herbarium as a portion of a mixed sheet labeled "Eleogenus obtusus." It is perhaps from the collection (*Drummond* 408) included by Boeckeler, Linnaea xxxvii. 450 (1869–1870) under *E. Dombeyana.*

62. E. TRICOSTATA Torr. (FIG. 75, 76). Rootstock stout, creeping, 2–5 mm. thick: culms 2–6 dm. high, usually slender, striate, compressed or sub-terete: sheaths 2–6 cm. high, loose, reddish to stramineous, with longitudinal striations, and a toothed apex: spikelets densely flowered, long-cylindric, 6–18 mm. long, 2–3 mm. thick, obtuse or sometimes acute: scales ovate, obtuse, reddish-brown with a yellowish midrib and a broad hyaline apex, often emarginate or reflexed: style 3-fid: achene yellow to dark brown, 0.8–1 mm. long, obovoid, with three prominent keel-like angles, the surface roughened-reticulate: style-base brown, short conical, acute: bristles none.—Ann. N. Y. Lyc. iii. 310 (1836); Boeckl., Linnaea xxxvi. 454 (1869–1870); Britton, Journ. N. Y. Mic. Soc. v. 108 (1889); Britton & Brown, Ill. Fl. i. 254, fig. 594 (1896); Small, Fl. S. E. United States 186 (1903); Robinson & Fernald in Gray, Man. ed. 7. 184, fig. 257 (1908).—Southeastern Massachusetts to Florida. MASSACHUSETTS: Almanac Pond, Nantucket, *Bicknell* in 1907; wet places, Nantucket, *Flynn* in 1899. NEW JERSEY: Deer Pond, Atco, *Meredith* in 1921; Whitesboro, *Van Pelt* in 1907; ditch, Atsion, *Meredith* in 1922; Davenport, *MacElwee* 614. GEORGIA: muddy margin of pinebarren pond, Decatur County, *R. M. Harper* 1199; wet pine-barrens, Sumter County, *R. M. Harper* 1008. FLORIDA: *Chapman* (without locality); moist sandy soil near Jacksonville, *Curtiss* 5667; pine-barren swamp, Duval County, *Fredholm* 5742.

63. E. ARENICOLA Torr. (FIG. 64, 65 and PL. 220, FIGS. 8, 9). Culms erect from extensively creeping reddish rootstocks, 0.5–4.5 dm. high, rigid, striate: upper sheath deep brown at base, usually becoming stramineous toward the truncate apex: spikelets ovoid to oblong, blunt, 4–13 mm. long, many-flowered: scales ovate, obtuse, brownish or yellowish, with a hyaline margin: style 3-fid: achene 1 mm. long, obovoid, triangular, with blunt angles, golden-yellow to brown, with a minutely punctulate to finely reticulate or almost spherulate glossy surface: style-base conical, short, sessile at the apex of the achene, or sometimes with a slight constriction: bristles 4–6, brown, toothed, equaling or shorter than the achene.—Torr. in Engelm. & Gray, Bost. Jour. Nat. Hist. v. 237 (1847); S. Wats., Bot. Calif. ii. 222 (1880); Small, Fl. S. E. United States 186 (1903). *E. montana* Britton, Journ. N. Y. Mic. Soc. v. 109 (1889) and in Abrams, Fl. Pacific

States i. 266, fig. 636 (1923); S. B. Parish, Bull. Southern Calif. Acad. Sci. iii. 83, pl. vii. (1904); Jepson, Man. Pl. Calif. 148, fig. 137 (1923). *E. Dombeyana* Boeckl. Linnaea xxxvi. 450 (1869–1870), in part. *Trichophyllum arenicolum* House, Am. Midland Nat. vi. 204 (1920).—Sandy soil, South Carolina to California, Mexico, and Guatemala (?); Brazil. The following specimens have been examined: SOUTH CAROLINA: Sullivan's Island, *Ravenel;* Isle of Palms, Charleston Harbor, *Robinson* 262; Navy Yard, Charleston, *Robinson* 255; Sullivan's Island, Charleston, *Robinson* 256. FLORIDA: sandy seashore, Apalachicola, *Chapman*, Herb. dup. 3869 (in part); damp soil near Dayton, *Deam* 1827; margin of Palm Creek, west of Everglades, Curtis 3073 G, Ph, B). LOUISIANA: Gretna, opp. New Orleans, *Ball* 345; Hale (without loc.). TEXAS: *Lindheimer* 205 (TYPE coll.); *C. Wright* 1859; Liberty County, E. Texas, *C. Wright;* Western Texas to El Paso, *C. Wright* 713; in low wet grounds, Tarrant County, *Ruth* 717 (Ph); Hondo, Medina County, *Pilsbry* in 1903 (Ph); Gamble's Ranch, Armstrong County, *E. J. Palmer* 13992 (B); Abilene, *Tracy* 7972; Cibolo River, Selma County, *Groth* 206; wet ground, Austin, E. *Hall* 696 (G, P); San Antonio, *Clemens* 391 (P), 392 (P). OKLAHOMA: Knowles, Beaver Co., *G. W. Stevens* 521 and 332; Marietta, Love County, *G. W. Stevens* 85; Shattuck, Ellis Co., *G. W. Stevens* 3109; Alva, Woods Co., *G. W. Stevens* 673; Thackerville, Love County, *G. W. Stevens* 59; Fair Valley, Woods County, *G. W. Stevens* 230 (G, P); Buffalo, Harper County, *G. W. Stevens* 290; between Seiling & Tologa, Dewey County, *G. W. Stevens* 882; Tishomingo, Johnston County, *G. W. Stevens* B3561. COLORADO: Fort Collins, *C. F. Baker* in 1893 (P). ARIZONA: Santa Cruz Bottoms near Tucson, *Griffiths* 4056; Huachuca Mts., *Griffiths* 4842, 4843; Willow Springs, *E. Palmer* 554; Fort Huachuca, *E. Palmer* 459; Reed's Ranch, Cave Creek, Chiricahua Mts., *Blumer* 2389. CALIFORNIA: sandy bed of Santa Ana River, San Bernardino County, *Parish* 5283; Santa River Canyon, *Munz* 2653 (P); Santa Ana R., *Parish* 11398 (spikelets elongated) (P); *Abrams* 507 (P); Glenn Ranch, Lytle Greek Canyon, San Bernardino County, *Abrams* 2740; Arrowhead Hot Springs, alt. 1600 ft., *Spencer* 1131 (G, P), and *Parish* 5529; Agua Caliente, *S. B.* & *W. F. Parish* 1568; Devil's Canyon, San Bernardino Mts., *Munz* 2774 (P); San Bernardino Valley, *Parish* 6295 (P); 1062 (Ph), and June 10, 1889 (P); San Bernardino, *Cummings* in 1896; San Gabriel River near Whittier, *Reed* 2276, 2274; Murrietta, *Munz* 2141 (P); Jacumba, *Munz* 1678 (P); Palm Springs, *Spencer* in 1918; El Monte, *Johnston* 1019 (P); west of Pomona, *Johnston* 1909 (P); *Coulter* 799 (without loc.); Santa Barbara, *Munz & Johnston* 11271; *J. T. Rothrock* 58; Los Angeles, *Nevin* in 1879; Los Angeles River, *Abrams* 1446 (P); Cuyamaca Mts., San Diego Co., *E. Palmer* 386; Cuyamaca Lake, *Harwood* 7247 (P); Oriflamme Canyon, 5 mi. east of Cuyamaca, *Abrams* 3930. MEXICO: Saltillo, *E. Palmer* 255 (G, N) and *Arsène* 10628 (G, N, I); vic. Durango, *E. Palmer* 390; 99,974 (G, N); Tobar,

Durango, *E. Palmer* 233 (G, N); San Diego, Chihuahua, 6000 ft., *Hartman* 611 (G, N); vic. Chihuahua, alt. 1300 m., *E. Palmer* 30 (G, N); Orizaba, *Botteri* 768, 770; Jalisco, *E. Palmer* 225; San Luis Potosi, circ. Morales, *Schaffner* 577, 578; Coahuila, alt. 1600 m., *Arsène* 3401 (N, I); Oaxaca, alt. 1550 m., *Conzatti* 94 & 356; sea level, vic. La Barro, Taumalipas, *E. Palmer* 287 (G, N); Route de Cholula, Puebla, alt. 2160 m., *Arsène* 902 (G, I); vic. of Puebla, *Arsène* 7162 (N); Cerró San Juan, vic. of Puebla, alt. 2170 m., *Arsène* 417 (N); vic. Hermosillo, Sonora, *Rose, Standley & Russell* 12507 (N); vic. Magdalena, *Rose, Standley & Russell* 15105 (N); quagmire, Rio de San Matras Guanajuato, *Dugés; Hartweg* 241; Cartegana, 7000 ft., *Liebmann.* GUATEMALA: swamps, *Heyde & Lux* 3554 (questionable). BRAZIL: in arenosis maritimis, Banhos do Mar, Rio Grande oppidum, Rio Grande do Sul, *Lindman*, Regnell 1 A701 (S).

There is some variation in the reticulation of achenes in *E. arenicola.* Material from Southeastern United States tends in general to have a deeper pitting or reticulation than specimens from California, the surface of the latter sometimes appearing as though covered with minute glassy spherules. Some of the specimens from Mexico are characterized by spongy culms, thickened rootstocks, sheaths with a long triangular mucro, and conspicuously imbricated scales which are black with whitish borders. The following specimens, all in the United States National Herbarium show these peculiarities and perhaps represent a distinct species: Santa Barba, vic. Puebla, alt. 2150 m., *Arsène* 1088; Cerro Tepoxachil, alt. 2300 m., *Arsène* 1039; Route de Chalula, alt. 2160 m., *Arsène* 902; vic. Puebla, *Arsène* 146 and 228.

64. E. PARISHII Britton (FIG. 66, 67 PL. 220, FIG. 12). Culms slender, striate, 1–3 dm. high, in fascicles from slender, extensively-creeping, reddish rootstocks: upper sheath brown or reddish below, stramineous above, the brownish apex truncate and toothed: spikelet linear-lanceolate, acute, 1–1.5 cm. long, rather loosely flowered; scales ovate-oblong, somewhat rigid, stramineous with chestnut or dark-brown sides, acute to obtuse with a short hyaline tip: style 3-fid: achene trigonous with a blunt outer angle, often nearly plano-convex, ellipsoid, narrowed at both ends, yellow to light brown, smooth or faintly reticulate under magnification: style-base acute, short-subulate to conic, sessile upon the body of the achene or surmounting a constriction at the apex of the achene: bristles white, 6–7, exceeding or shorter than the achene, retrorsely toothed.—Journ. N. Y. Mic. Soc. v. 110 (1889) and in Abrams, Ill. Fl. Pacific States i. 265, fig. 635 (1923); Jepson, Man. Calif. 148, fig. 136 (1923).—Nevada and California to Mexico. The following specimens have been examined. NEVADA: Las Vegas, alt. 1000 ft., *Jones* in 1905. CALIFORNIA: Palm

Springs, western edge of the Colorado Desert, *S. B. Parish* 6145; Chico, hb. *C. F. Baker* 3280 (coll. E. B. Copeland); edge of pool, Cottonwood Springs, Mohave Desert, *Munz & Johnston* 11201 and 11200 (the latter collection with blunt spikelets (pathogenic ?)); Ibex Spring, Inyo County, *Parish* 11025; Hornbrook, Siskiyou County, *Copeland* 3556; Sespe Creek, alt. 2300–2500 ft., *Abrams & McGregor* 181; Santa Inez Mts., *Cooper* 122; shore of Owens Lake, *Hall & Chandler* 7325 (P); vic. of Bonanza King Mine, east slope of Providence Mts., Mohave Desert, alt. 7000 ft., *Munz, Johnston & Harwood* 4142 (P); Palm Springs, *Munz, Street & Williams* 2328 (P); Prairie Fork of San Gabriel River, San Antonio Mts., alt. 5000 ft., *Johnston* 1631 (P). NEW MEXICO: Mangas Springs, 18 mi. northwest of Silver City, *Metcalfe* 218 (G, P). ARIZONA: Beaver Dam Creek, Virgin River, *Goodding* 764. MEXICO: Mesquite Spring (Mex. Boundary Surv.), *Mearns* 192; Lake Santa Maria, Chihuahua, *E. W. Nelson* 6415.

Elongated spikelets with mottled scales distinguish this species of the desert regions of the southwestern United States and northern Mexico from the two related species, *E. montana* (especially the Mexican phase known as *E. truncata*) and *E. arenicola*, and the essentially smooth achenes with somewhat elongated tubercles suggest that the closer relation is with the former. The type-collection, *S. B. Parish* 1569 is from Agua Caliente, San Diego County, California. The illustrations, made from Parish 6145 from the same locality, show achenes with constricted apex, but achenes with non-constricted apices with the tubercle appearing sessile (as in the illustration by Jepson) are common as are also the intermediate stages.

E. disciformis Parish, Bull. Calif. Acad. Sci. iii. 81, t. vi. (1904) and Britton in Abrams, Ill. Fl. Pacific States i. 264 (1923), an annual species with fibrous roots, is known only from the single collection "at the eastern base of the San Jacinto Mts., on the borders of the Colorado Desert, *H. M. Hall* 2013, June, 1901." Parish's illustrations of the immature achene of *E. disciformis* and the achene of *E. Parishii* are strikingly similar, and though the type at the New York Botanical Garden has the general appearance of a small (10–15 cm. high) *E. Parishii*, the annual habit may be sufficient to distinguish it as a distinct species.

65. E. MONTANA (HBK.) R. & S. (FIG. 70–72 and PL. 220, FIG. 10). Culms 0.5–3 dm. long, from elongate creeping rootstocks: sheaths as in *E. arenicola:* spikelets ovate to linear-lanceolate, 8–12 mm. long, acute, many-flowered, often with rather loose scales: scales ovate-

elliptic, usually acute, brown with a yellowish or green midrib and a hyaline margin: style 3-fid: achene 1–1.3 mm. long, obovate, shining yellow or brown, trigonous with blunt outer angle, the surface smooth or very obscurely reticulated: style-base mucroniform, acute, usually with nearly parallel sides: bristles brown, 4, exceeding or shorter than the achene.—Syst. ii. 153 (1817); Britton, N. Y. Mic. Soc. v. 109 (1889) in part; C. B. Clarke in Engler Bot. Jahrb. xxx. Beibl. 68. 24 (1901); Barros, Anales Mus. Hist. Nat. Buenos Aires xxxiv. 476, fig. 26 (1928); *Scirpus montanus* HBK. Nov. Gen. i. 226 (1816); *E. Dombeyana* Kunth, En. ii. 145 (1837); Boeckl. Linnaea xxxvi. 450 (1869–1870) in part; *E. vulcani* Boeckl. Engler Bot. Jahrb. viii. 206 (1887).—Argentina and through the Andes to Mexico. ARGENTINA: Prov. Tucuman, Dept. Chicligasta, *Venturi* 4753; Prov. Catamarco, Dept. Andalgalá, *Jörgensen* 1646; Prov. Cordoba, *Lossen* 139. PERU: Casa Caucha, *Wilkes Exped.;* Oragilla, *Wilkes Exped.* BOLIVIA: La Paz, alt. 3750 m., *Buchtien* 149 in 1919; La Paz, alt. 3800 m., *Buchtien* 1483; vic. La Paz, alt. 10,000 ft., *Bang* 144; vic. Cochabamba, *Bang* 996 (G, N); La Paz, alt. 3650 m., *Buchtien* 6399 (N) and alt. 3550 m., *Buchtien* 6409; in arenosis, Prov. Larecaja, vic. Sorata, 2000–3000 m. alt., *Mandon* 1415 (S). ECUADOR: *Spruce* 5912; in hot springs at Baños, vic. Cuenca, *J. N. Rose* 22893; Prov. Chimborazo, Huigra, alt. 1200 m., *A. S. Hitchcock* 20395; *Lehmann* 5935 [or Colombia?] (N); prope Riobamba, *Mille* 337 (N); Tilulun, vic. Ambato, prov. Tungurahua, *Pachano* 110 (N); am Cotopaxi, 3200 m., zu saltpeter saltigem Wasser, *Lehmann* 414 (TYPE coll. of *E. vulcani* Boeckl.) (N). MEXICO: bordes des fossés près Mexico, *Bourgeau* 214 (G, N) (distributed as *E. truncata*); Valley of Mexico, *Pringle* 7655; wet soil, Cuantitlan, *Pringle* 8214; Hda. Guadeloupe, Puebla, 2130 m., *Arsène* 1160 (very young). The young specimens numbered *Rose, Coulter & Rose* 8736 from Hidalgo, and *E. Palmer* 390, vic. Durango, probably belong here.

E. Dombeyana Kunth is here considered as a synonym of *E. montana*, since the material from the Andes seems homogenous and only one species appears to be represented. The type of *E. montana* was collected in the Quindiu Pass, Colombia. Within this species, as did Clarke and Boeckeler, I have included *E. truncata* from the Federal District of Mexico, which has similar achenes, but a spikelet usually longer and proportionally narrower than those observed in the Andean plants. Lehmann's no. 8735, from Colombia, which was considered (RHODORA xxiv. 25 (1922)) as perhaps representing *E. montana* (HBK.) R & S., appears on close examination to be *E. nodulosa*.

66. E. **Palmeri**, n. sp. (FIG. 73, 74 and TAB. 220, FIG. 11), culmis non rigidis, 15–21 cm. altis, e rhizomate lignescente; vaginis superioribus 2–3.5 cm. longis, supra stramineis, infra atro-brunneis, apicibus truncatis mucronatis: spiculis 3–8 mm. longis, cylindrico-ovoidis,

obtusis; squamis ovato-oblongis, obtusis, ad marginem hyalinis, frequenter emarginatis, in medio viridescentibus: stylo 3-fido: staminibus 3: achaenio 1–1.3 mm. longo, nitente, brunneo, pyriforme, obtuse trigone, sub lente paullo reticulato; stylo-basi triangulare pyramidali, acuta, achaenio quadruplo angustiore; setis 6, albidis, achaenium aequantibus, infra in disco conjunctis.—Known from a single collection, *E. J. Palmer* 33464, wet margins of Pecos River, in deep limestone canyon, near the Rio Grande, Valverde County, TEXAS (TYPE in Gray Herbarium). From *E. arenicola* it may be distinguished by the lighter scales, acute style-base and less clearly reticulated achenes.

67. E. BOLANDERI A. Gray (FIG. 68, 69). Culms very numerous, 1–3 dm. high, about 0.5 mm. in diameter, glaucous-green, erect and wiry, from a short woody rootstock: sheaths usually stramineous, sometimes purplish at base, 2–3 cm. high, slightly swollen at the indurated purplish summit, rarely with a mucro: spikelets 3–8 mm. long, elliptic to ovate, blunt or acute, about 10–20 flowered; scales dark brown to black, ovate, acute, with a short whitened scarious tip, the lowest orbicular: stamens 3: style 3-fid: achene obovoid, 1.5 mm. long, golden-yellow to black, trigonous with a blunt outer angle, with a cellular surface under magnification: the truncate apex forming a depressed style-base with a short apiculate central projection: bristles 3–4, retrorsely toothed, reddish-brown, ½ to ¾ the length of the achene.—Proc. Am. Acad. vii. 392 (1868); Jepson, Fl. Cal. 194 (1922) and Man. Fl. Pl. Cal. 148, fig. 134 (1923); Britton in Abrams, Ill. Fl. Pacific States i. 265, fig. 633 (1923).—Northern California and Southern Oregon. CALIFORNIA: bank of creek at Clarke's, *Bolander* 4869 (TYPE in Gray Herbarium); North Fork and vicinity, *D. Griffiths* 4487; Duffield Canyon, Soulsbyville, *Jepson* (as *E. montana*); Milburn, Mariposa County, *Congdon* in 1890; Mather, Tuolumne County, alt. 4500 ft., *Munz* 7390 (P); Eagle Lake, Susanville, alt. 5000 ft., *M. E. Jones* in 1897. OREGON: Owyhee, Mathew Divide, alt. 1250 m., *J. B. Leiberg* 2170; in large dense tufts in swales of "Paradise," Wallowa County, 4000 ft. alt., *W. C. Cusick* 2412 (G, P).

E. Bolanderi stands between *E. arenicola* and *E. capitata*, both in geographical range and character of the achene, the surface markings resembling those of *E. arenicola*. The markedly indurated rhizome with its persisting bristle-like culm-bases is perhaps the most distinguishing feature. The type specimen has stramineous, evidently faded, culms, and only a few good achenes, all of which are golden-yellow. The plants collected by Jepson and Congdon, cited above, show achenes which are almost black. Whether the darkened color is a normal condition or due to great maturity, cannot be determined with the limited number of specimens at hand.

68. E. DECUMBENS Clarke (FIG. 52, 53). Culms elongated, 5–6 dm. long, striate, subterete, from a stout rootstock with fibrillose roots, the culm-bases covered by conspicuous lanceolate, light-brown scales, 2–3 cm. long: spikelet ellipsoid, obtuse, 5–7 mm. long, 3.5–4

mm. thick; scales brown, ovate, obtuse: style 3-fid: achene about 1 mm. long, trigonous, yellow, minutely reticulated, with a roughened ovoid-triangular style base ⅓ as long as the achene: bristles brown, 2 or 3, some of them equalling the achene.—Kew Bull. Add. Ser. viii. 23 (1908); Britton in Abrams, Ill. Fl. Pacific States, i. 265, (fig. 634) (1923).—CALIFORNIA: Mt. Shasta, alt. 2500 m., *H. E. Brown* 424, and Yosemite National Park (acc. to Britton, l. c.).

Dr. J. K. Small has very kindly lent me the specimen (TYPE collection) in the Herbarium of the New York Botanical Garden, from which the illustration has been made.

69. E. FALLAX Weatherby (FIG. 77, 78). Perennial; rootstock creeping, about 2 mm. in diameter, beset with sheathing, herbaceous, striate, long acuminate, dark red scales: culms clustered, subterete or, at least in dried specimens, slightly compressed and somewhat elliptic in cross-section, striate, slender (0.5–1.1 mm. in diameter at the summit of the upper sheaths), 3–7.6 dm., averaging 3–4 dm., tall: upper sheaths tinged with red, subobliquely truncate at summit, the margin there entire, not thickened and cartilaginous nor hyaline, finely red-punctate when young, dark in age: spikelets ovate or lanceolate, acute, 7–10 mm. long, about 3 mm. broad; scales ovate- or obovate-oblong, obtuse, 2.5–3 mm. long, castaneous or dark red above with green mid-rib and narrow hyaline apex and margin: styles three-parted: bristles present, 3–4 (–5), downwardly barbed, half as long as the achene or only a little shorter: achenes 1.7–2 mm. long (tubercle included), about 1 mm. broad, obtusely triangular, obovoid, yellow, very slightly reticulate-roughened by the raised walls of the epidermal cells, persistent after the fall of the scales: tubercles gray, pyramidal, acute, 0.4–0.5 mm. high, about as broad or a little narrower, evidently distinct from the body of the achene, the base wider than the point of attachment so that the lateral portions, especially at the angles, are free.—RHODORA xxiv. 23. (1922). MASSACHUSETTS: fresh and brackish springy border of Dinah's Pond, Yarmouth, Aug. 16, 1919, *Fernald & Long*, no. 18,025.

This peculiar plant, the status of which still remains unknown, has the characteristics of both sub-series *Truncatae* and *Palustres*. The locality has been twice examined by the writer, without locating the source of the specimens. The intermediate morphological characters together with its seeming evanescence would suggest a hybrid, possibly *E. uniglumis* var. *halophila* and *E. capitata* var. *borealis*. Such abundant fruit however, as occurs in the material would not be expected in a plant of hybrid origin. The above description is Mr. Weatherby's (l. c.) as well as the following quotation. "It has the aspect and entire sheaths of the group of *E. palustris*, but 3-parted styles and bluntly trigonous achenes. It combines some of the

characters of *E. capitata* (*E. tenuis*) and of *E. arenicola* and differs from the former in its much smoother achenes and in the regular presence of bristles, from the latter in that the achenes are persistent after the fall of the scales, and from both in the larger size of the achenes and the entire sheaths."

GEOGRAPHICAL DISTRIBUTION OF SUB-SERIES TRUNCATAE

This subseries[1] belongs entirely to the New World, where it has its great development in North America. The circle of species, *E. capitata, nitida, compressa,* and *acutisquamata,* offers a difficult problem in specific delimitation. *E. arenicola* is a localized species of the coastal sands from South Carolina to Florida, extending westward along the Gulf States and into Mexico and California, being apparently replaced in desert areas of the southwest by *E. Parishii.* The related *E. Palmeri* is known only from a single station on the Rio Grande. In the mountains of western United States two species, *E. decumbens* and *E. Bolanderi,* are segregated, each in a comparatively small area. Extending northward into Mexico from the Andes is a single species, *E. montana,* under which has been included *E. truncata.*

E. cylindrica, a Texan species with slender elongated spikelets, seems more closely related to the South American series *Sulcatae* and is not treated here. *E. albida,* which I have provisionally placed in the *Sulcatae,*[1] though the achenes are deep brown when over-ripe, differs from all members of the *Palustriformes* in the stout cylindric reddish bristles with close-set teeth, and, perhaps, together with *E. bermudiana,* represents an isolated group.

EXPLANATION OF PLATE 219

(Habit-drawings × ½; achenes × 15)

Figs. 52 and 53, E. DECUMBENS, from TYPE specimen; 54 and 55, E. NITIDA, from TYPE specimen; 56 and 57, E. CAPITATA var. TYPICA, *Robinson* 470, Virginia; 58 and 59, E. CAPITATA var. BOREALIS, *Fernald* 20147, Nova Scotia; 60 and 61, E. ACUTISQUAMATA, *Buckley,* Texas; 62 and 63, E. COMPRESSA, from TYPE collection.

EXPLANATION OF PLATE 220

(Habit-drawings × ½; achenes × 15)

Figs. 64 and 65, ELEOCHARIS ARENICOLA, South Carolina, *Robinson* 256; 66 and 67, E. PARISHII, California, *Parish* 6145; 68 and 69, E. BOLANDERI, Oregon, *Bolander* 4869; 70 and 71, E. MONTANA, Mexico, *Bourgeau* 214; 72, E. MONTANA, Columbia, *Lehmann* 5935; 73 and 74, E. PALMERI, from TYPE specimen; 75 and 76, E. TRICOSTATA, New Jersey, *MacElwee* 614; 77 and 78, E. FALLAX, from TYPE specimen.

[1] RHODORA XXXI. 129 (1929).

EXPLANATION OF PLATE 221

Achenes (× 20): Fig. 1, ELEOCHARIS CAPITATA var. TYPICA, New York, *Ferguson* no. 1502; 2, E. CAPITATA var. VERRUCOSA, Missouri, *Eggert;* 3, E. CAPITATA var. PSEUDOPTERA, Delaware, *Svenson* no. 3457; 4, E. CAPITATA var. BOREALIS, Newfoundland, *Fernald & Wiegand* no. 4710; 5, E. COMPRESSA, Kansas, *Scarborough;* 6, E. COMPRESSA var. ATRATA, Michigan, *E. T. & S. A. Harper;* 7, E. ACUTISQUAMATA, Texas, *Tharp* no. 995; 8, E. ARENICOLA, Louisiana, *Ball* no. 345; 9, E. ARENICOLA, California, *Spencer;* 10, E. MONTANA, Peru, *U. S. Exploring Expedition;* 11, E. PALMERI, Texas, from TYPE specimen; 12, E. PARISHII, California, *Parish* no. 6145. Cross-section of culm (approximately 40 ×): Fig. 13, E. CAPITATA var. TYPICA, New York, *Svenson* no. 3496; 14, E. CAPITATA var. VERRUCOSA, Missouri, *Eggert;* 15, E. CAPITATA var. BOREALIS, Massachusetts, *Bartlett* no. 486; 16, E. CAPITATA var. PSEUDOPTERA, Delaware, *Svenson* no. 3457; 17, E. CAPITATA var. TYPICA, Virginia, *Leonard* no. 321; 18, E. COMPRESSA, Indiana, *Deam* no. 31950.

ASTROPHYTUM ASTERIAS IN THE UNITED STATES

ELZADA U. CLOVER

(Plate 223)

A SHIPMENT of cacti from Miss Flossie Garrison, collected in the Rio Grande Valley, Texas, was received in January, 1932 by the University of Michigan Botanical Gardens. Among them was a small specimen of *Astrophytum asterias* (Zuccarini) Lemaire of unusual interest since as far as known this species has never been reported as occurring in the United States.

Britton and Rose (The Cactaceae) record it only for Northern Mexico near Nuevo Leon, and at Ciudad, Tamaulipas. It has been found at Victoria, Tamaulipas by Romeo Posselt, an exporter of cacti, who says that in that locality it grows 200–300 meters above sea level, in limy, heavy soil. He also states that it is usually found growing in groups of from five to twenty plants in grass and under small, thin shrubs, and never found in close proximity to other succulents.

This species of *Astrophytum* is undoubtedly reputed to be rare since the Mexican Government has absolutely prohibited its exportation.[1]

The specimen from South Texas (Mich. Bot. Gard. No. 14503) was found by M. A. Clover on a ranch in Starr County eight miles north of Rio Grande City. It was growing in sandy loam on a south slope. Since its discovery a few other specimens have been found in the same locality.

Astrophytum asterias is a much depressed, spineless cactus, 2 cm.

[1] New Mexican Laws Concerning Cacti. Monatschrift der deutschen Kakteen-Gesellschaft. Mar. 1931, p. 71.